The Citrus Industry

Representative of Every Interest

Representing No Special Interest

Single Copy ..... 15 Cents
Subscription
$1.00 Per Year In Continental U. S.
$2.50 Per Year Outside

DR. JAMES T. GRIFFITHS
Well known throughout the Florida Citrus Industry

VOL. 40 — NO. 12 DECEMBER, 1959 BARTOW, FLORIDA

Swift's EXTRA MEASURE of Pesticide Quality...

PAYS OFF at the Market Place

What a beautiful sight when citrus moves to market. And right now you can help assure hundreds of extra harvest dollars by just investing a few in **Gold Bear** pesticides . . . insecticides and fungicides. That's why **Gold Bear** belongs in your market picture.

Why **Gold Bear?** Two reasons: First the ingredients—the finest of the old, and the tested of the new . . . all selected for quality, potency and life in storage.

Second—ever-watchful quality control of every ingredient and process to assure you of trouble-free, uniform application and higher killing power with either liquids or dusts.

Plan now to use Swift's **Gold Bear** products . . . ever on guard for your crop dollars. Then relax . . . and collect at the market place.

CONSULT ONE OF THESE REPRESENTATIVES

R. V. ALBRITTON
110 So. Pine St., Sebring
Ph. EVergreen 5-4551

L. D. ALDERMAN
Box 36, Wimauma
Ph. 47-4291 (Tampa)

W. P. BASS
2506 Center St., Orlando
Ph. 5-8081

P. J. DRISCOLL
Box 333, Clermont
Ph. EXeter 4-5401

J. M. FENNELL
Box 295, Tice
Ph. EDison 7-6681

G. B. GARRARD, Jr.
830 E. Stuart St., Bartow
Ph. CApitol 3-4381

J. W. GRAY, Jr.
676 Ave. F, S.E.
Winter Haven
Ph. CYpress 3-5413

C. C. HELMS
Box 922, Homestead
Perrine, Ph. CEdar 5-2920

RICHARD S. PIKE
Box 124, Vero Beach
Ph. JOrdan 7-2375

P. M. SCHAILL
219 North Pine
Fort Meade
Ph. ATwater 4-4151

W. V. WEBB
3607 Corona St., Tampa
Ph. 66-0201

R. L. WILSON
243 S.E. 7th Ave.
Deerfield Beach
Ph. Boca Raton 5357

E. L. WOOD
Box 2123, Univ. Stat.
Gainesville
Ph. FRanklin 6-7064

Mac DOLLAR says:

WHEN YOU'RE FARMING TO MAKE MONEY, SWIFT'S YOUR FINEST BUY!

— SWIFT & COMPANY • Agricultural Chemical Division • Winter Haven and Pompano Beach

The Importance And Early History Of The Temple Orange

Seldom in horticulture can the tree be found which a major part of the production of a given variety of fruit originated. There are a few notable exceptions, and the Temple orange of Florida is one. It was introduced into Florida prior to 1894, presumably from Jamaica 1. The variety has been propagated commerically since 1917 2/. Today the Temple orange is widely known for its beauty of color and fine eating quality. The richness and spiciness of its juice and flesh contribute to its taste appeal. This orange is probably a natural hybrid of **Citrus reticulata x C. sinansis** 3/. or, technically speaking, a "tangor." The popularity of the Temple orange is shown by the extensive plantings in Florida—of over a million, six hundred thousand trees, representing about twenty-five thousand acres.

The "parent" Temple tree (fig. 1), although relatively old, is in fairly good physical condition and stands on the private estate of James Gamble Rogers II, in Winter Park, Fla. It was my good fortune to have known the late Mr. Louis A. Hakes (fig. 2), an early owner of this tree and the surrounding grove. He named this new fruit for his friend, William Chase Temple. It was through Miss Louise Allen, owner of a first generation Temple orange grove, that I made the acquaintance of Mr. Hakes some years ago, when I was studying the seasonal changes of the Temple orange 4/. At my suggestion, Mr. Hakes prepared a history of the Temple orange and gave me permission to publish it.

Mr. Hakes was an humble and retiring gentleman. He cautioned

PAUL L. HARDING
AGRICULTURAL MARKETING SERVICE
USDA, ORLANDO, FLA.

PRESENTED AT MEETING FLORIDA STATE HORTICULTURAL SOCIETY

me against publicising his name, saying ". . . please bear in mind that it is the history of the Temple orange that is being undertaken, and not that of Louis A. Hakes."

Fig. 2. Louis A Hakes, former well-known Florida citrus man and developer of the Temple orange; died in Albion, N. Y, June 26, 1952. He was in his late seventies.

Mr. Hakes' principal interest was to have the origin of the Temple orange accurately recorded as is shown by the following quotation from one of his letters: "I am very glad that you have undertaken the task of digging out and publishing the facts regarding the history of the Temple orange in Florida. So many erroneous accounts of its origin and history have been circulated and published that it seemed hopeless for me to try and correct them."

Mr. Hakes died June 26, 1952, at Albion, N. Y. He should be remembered by the citrus industry for his important role in the introduction and naming of the Temple orange. Modest and generous man that he was, he chose to give his friend's name to this remarkable fruit, and it is feared that perhaps in time Mr. Hake's contribution to the Florida citrus inductry may be forgotten.

The origin and history of the Temple orange as reported here by Mr. Hakes is in general agreement with historical notes reported to the Florida State Horticultural Society by Robinson 1/ in 1945. Thus, it is with pleasure that I accept the permission granted me by Louis A. Hakes to publish verbatim his "Early History of the Temple Orange."

"The so-called 'Parent' Temple Orange Tree is in a grove located at what was known as No. 1290 Palmer Avenue, Winter Park, Florida.

"Louis A. Hakes arrived in Florida in December 1913 to take charge of that grove and purchased the property from his father, John S. Hakes in 1914. John S. Hakes purchased the property from a Mr. Wyeth in 1911 or 1912. A letter dated May 25, 1937, to Louis A. Hakes from Wyndham Hayward, Lakemont Gardens, Winter Park, Florida, states in part, 'I found at

Continued on page 20

1/ Robinson, T. Ralph 1946. The Origin of the Temple Orange. Fla. State Hort. Soc. Proc. (1945) 58:3-5.

2/ Hume, H. Harold 1957. Citrus Fruits, p. 72. The Macmillan Company.

3/ Webber, H. J. 1943. Cultivated Varieties of Citrus. In Webber, H. J., and Batchelor, L. D., eis., The Citrus Industry, V. 1, pp. 475-668, illus. Berkeley.

4/ Harding, Paul L., and Sunday, Milliard B. 1953. Seasonal Changes in Florida Temple Orange. U. S. Dept. Agr. Tech. Bul. 1072, 61 pp., illus.

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

Small Power Tools For Pruning Citrus . .

A. H. KREZDORN AND P. J. JUTRAS
CITRUS EXPERIMENT STATION, LAKE ALFRED, FLORIDA

The development of the hedging machine by Prosser (1) at the Florida Citrus Experiment Station was an imaginative approach to the problem of pruning crowded citrus trees, and many such groves have been effectively hedged with these machines. However, as ingenious and effective as these large machines are, they have several undesirable features. They are very expensive to build and they cannot be used for selective pruning. Of more significance, they are unsuitable for groves in the Indian River and similar areas where, to provide for water drainage, the trees are grown on beds and the planted area is commonly traversed by deep ditches.

One reason for the development of the large hedgers was the unavailability of adequate small power tools; however, in the past few years various manufacturers have developed excellent, highly versatile pruning equipment.

In the process of carrying out pruning research, the authors have had the opportunity to use and evaluate much of this new equipment. It is the purpose here to describe some of the small power pruning tools available, not from the standpoint of recommending specific makes, but from the standpoint of general types, which may be manufactured by one or more concerns.

One useful means of classifying power pruning tools is as to the type of motor or engine that powers the cutting surface: e.g., gasoline, electric and air. The gasoline powered types are integral mounted units. The electric and air types require remote generators and compressors, respectively, that can advantageously be used to run a variety of other equipment.

Gasoline Engine Powered Tools

The gasoline engine powered tools can further be divided into chain and reciprocating saws. These types,

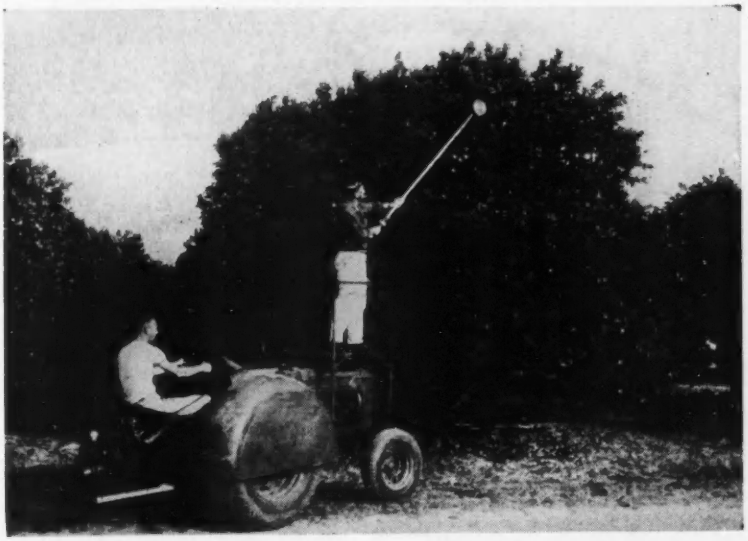


Fig. 1. Simple but effective pruning rig constructed by Florence Citrus Growers Association for hedging, using high speed electric circular saws. Air equipment could be used similarly by substituting a PTO or trailer mounted compressor. Saw operator and driver alternate. Note face mask used by operator.

particularly the chain saw, have been in use for several years. Their primary advantages are dependability, safety, and the ability to cut through the largest of limbs quickly. Of the two, the reciprocating saw makes much the smoother cut and has the decided advantage of being able to cut in narrow angle crotches and to cut flush with the adjoining limb. Both have the disadvantages of excessive weight and the inability to cut the small branches and twigs that make up the brunt of pruning work. Thus, they lack pruning versatility, but, because they are so useful for grove operations, such as dead tree removal and buckhorning, they unquestionably have a place in citrus operations.

Electric Tools

Available electric equipment includes the chain saws and two circular saw types.

The electric chain saw is not widely used by citrus growers in this State. It is light in weight but early models were not as durable as their gasoline counterparts. Recent models have proven more rugged. The electric cord connecting the saw to the generator, as with all remote powered equipment, is somewhat cumbersome. All electrical equipment should be grounded according to Florida Industrial Commission requirements (3). Otherwise the characteristics of the electric model are similar to those of the gasoline type.

The Homelight electric pruner is a durable tool of unique design. It is composed of a circular rim blade with teeth around the periphery. The teeth are exposed only between two guide tines, making it extremely safe. A unique spring-loaded kerf wedge prevents binding. The saw is mounted on a short pole having the drive shaft in the center and a motor and trigger on the lower end.

The saw makes smooth cuts flush with the adjoining limb but is limited to cuts of 1-¾ inches or less. Because of the relatively low speed of the blade, cutting near the extremities of small branches results in excessive limb vibration and ragged cuts, precluding its use for hedging.

The Kwik-Kut circular electric saw, while also having its limitations, has proven one of the most versatile types to date. It consists of a high speed (10,000 r.p.m.) circular saw blade and a gear head mounted on an aluminum pole having a drive shaft down the center

(Continued on next page)

SMALL POWER TOOLS FOR PRUNING CITRUS

(Continued from preceding page)

and a motor and trigger on the lower end. Poles with enclosed drive shafts are available in lengths up to 6 feet, and are easily interchangeable.

Fig. 2. Pruning with high speed air chain saw on 12 foot extension. Note size of cut made at (a) and flush cut made at (b). Saw is 9 inches long.

The saw has proven very durable. It has a great deal of power and makes very smooth cuts. Limbs 4 to 6 inches in diameter can be removed by undercutting and working around the limb. Small and moderate size limbs can be cut through in a fraction of a second either as selective or as shaving or hedging cuts.

The saw was introduced into Florida just prior to the 1957-58 freeze and most were first used for pruning the cold damaged trees. However, since then, many growers have constructed movable platforms or towers of various types from which they carry out the entire hedging operation. There are no adequate figures on the cost of hedging in this manner but operators using both hedging machines and the electric saws report that the labor costs are about equal. Much depends on the ingenuity in constructing the platform and the organization and efficiency of the operators. The saw is also widely used to dress-up the rough cuts of the hedging machine and to prune the tops of tall trees that the hedging machines do not reach. An 8-inch blade is used most commonly for hedging while the 6-inch blade can effectively be used for removing water sprouts.

Functionally, they are not perfect for removing a large limb attached at a narrow angle because the gear head at the back of the blade will not fit into the narrow crotch. In such cases the limb must be cut through several times before a flush cut can be made. This is particularly true of the old model; however, the newest model has a much smaller gear head that somewhat reduces this problem. Also, while classed as a light saw (12-½ pounds) and quite well balanced it is too heavy for continuous one-man operation.

The biggest drawback, in most growers' minds, is the inherent danger to the operator and the helper of an unprotected circular saw turning at 10,000 r.p.m. This danger is undeniable and the saws

(Continued on page 14)

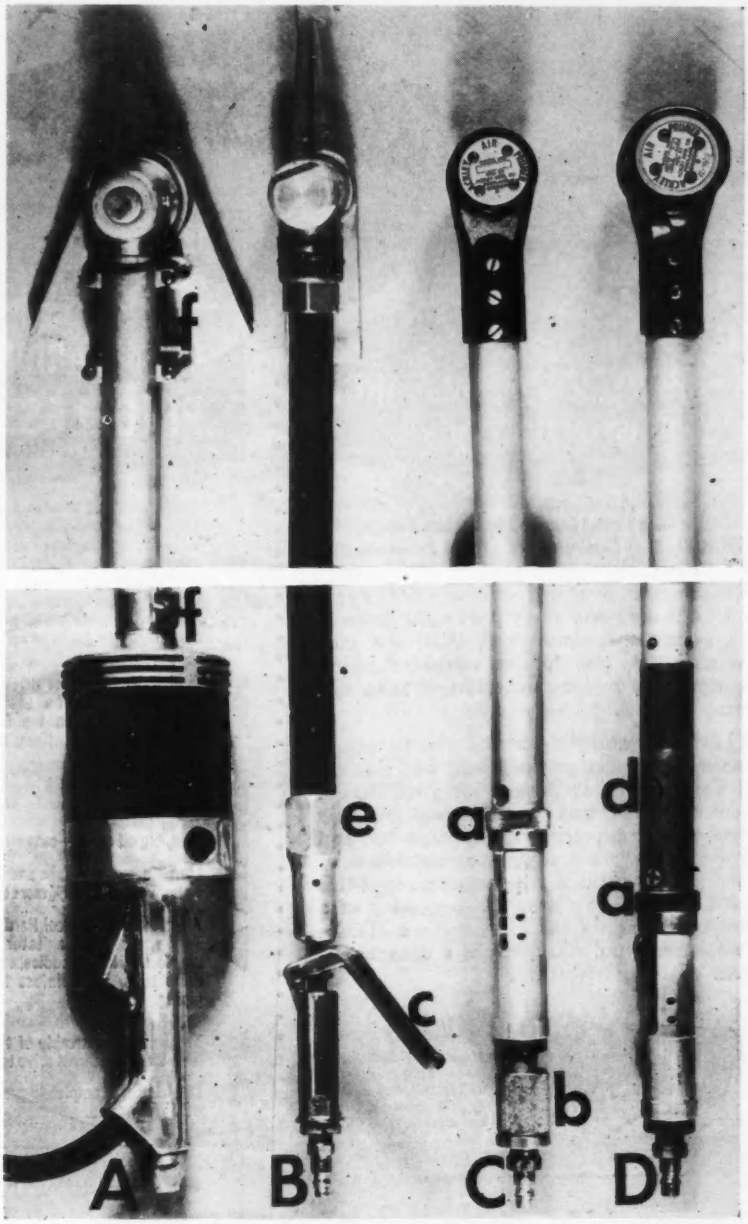


Fig. 3. Motor and trigger (bottom) and gear head (top) of (A) Kwik-Kut electric saw; air flow controls (bottom) and motors (top) of (B) small Kwik-Kut, (C) large and (D) small Ackley air saws. Turning knurled knob (a) locks the air control lever on or off; pushing up collar (b) increasing speed from moderate to high; holding lever (c) half-way and full down operates saw at moderate and high speed respectively. Handles are removed for adding or changing extensions by depressing lock pin (d); unscrewing threaded collar (e); or loosening clamps (f).

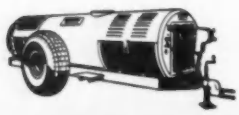
97,500

CUBIC FEET OF AIR PER MINUTE

THE HIGHEST LEVEL OF SPRAYER PERFORMANCE IN THE WORLD TODAY...

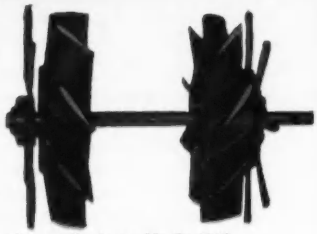
Measured by any standard—judged by any detail—this new Hardie Duo-Fan Model No. DF-800, two-fan sprayer is the greatest and most advanced sprayer ever built. Not only is it a bigger sprayer than ever before available, but each and every part right down to the nozzle tips saves time, labor and cuts maintenance cost to the vanishing point. It simply is bigger and stronger than any spray job.

What other sprayer permits you to adjust nozzles, even change tips, easily and quickly in the field, spray largest trees on BOTH sides of the row and meet the most gruelling tests with more than ample capacity and power? Growers everywhere, regardless of acreage, will thrill to the performance of this great sprayer. It marks the beginning of a new era in pest control. There is a Hardie dealer near you. Ask him for a demonstration. Write for literature.



Hardie DF-520 includes the same advanced features as the DF-800, with over 62,500 cubic feet of air per minute.

ONLY HARDIE BRINGS YOU THESE PRICELESS ADVANCEMENTS



- Hardie patented two-fan assembly. Two, 40 inch axial flow fans mounted with blades opposed on a single shaft, delivering 97,500 CFM plus. Approximately 30% more air volume than a conventional single 40" fan. Covers more acres per hour than any other make of sprayer.
- 36 nozzles—18 on each side—for discharge on either or BOTH sides. Each nozzle can be easily and quickly adjusted in the field for any desired spray pattern. Nozzle tip sizes easily changed in the field
- Rugged, powerful 501 Cubic Inch Heavy Duty engine designed for long, sustained operation. 50 gallon oversize gasoline tank [runs all day without refilling]. L-P gas engine available
- New, big oil cooler—cuts oil cost.
- Long life, oversize, tube and fin radiator gives 15% to 20% more cooling.
- All-new stainless steel Hardie-Klad Tanks, stainless agitator shaft, stainless agitator paddles, stainless drive tube, all stainless interior piping.
- Transmission assembly of tremendous strength. Direct drive to fans.
- Fan bearings completely protected, easily lubricated.

AIRCRAFT TYPE REMOTE CONTROL

DEPENDABLE... PROVEN

Heavy duty construction, simple design, easy to operate. Controls throttle and spray delivery on one or both sides.

MANUFACTURERS OF:

Agricultural Sprayers

•

High Pressure Pumps

•

Dusters

HARDIE
PEST CONTROL EQUIPMENT
• SOLD AND SERVICED ALL OVER THE WORLD

Write today for illustrated literature. Use the coupon.

The Hardie Manufacturing Co., Inc.
Dept. CI
Wilkes-Barre, Pa.

Please send me Duo-Fan Sprayer data.

NAME.....

ADDRESS.....

CITY.....STATE.....

SPRAYERS "ARE" OUR BUSINESS -- OUR ONLY BUSINESS FOR OVER 65 YEARS

Soil Application Of Manganese For Citrus[1] . . .

C. D. LEONARD AND IVAN STEWART
FLORIDA CITRUS EXPERIMENT STATION
LAKE ALFRED

C. D LEONARD

Florida citrus groves on acid soils usually receive manganese as part of a mixed fertilizer. For groves on calcareous soils, however, this element normally is applied as a foliage spray, since application in the fertilizer usually is not effective on these soils.

Manganese deficiency symptoms frequently appear in relatively mild form on new leaves, but in most cases these disappear within a month or two without any special treatment. These transient symptoms appear to be due to a marginal supply of available manganese in the soil, from which the tree roots temporarily are unable to extract enough manganese to supply the large, rapidly-growing new flush of growth. More persistent cases of manganese deficiency on trees growing on either acid or calcareous soil indicate a lack of sufficient available soil manganese and require corrective treatment.

Earlier studies (6,7) indicated that the availability of soil applications of zinc to citrus trees is greatly increased by applying soluble zinc compounds with calcium chloride in concentrated areas or piles beneath the trees. Similarly, the present report is a study of manganese 'availability to citrus when this element is applied to both acid and calcareous soils.

REVIEW OF LITERATURE

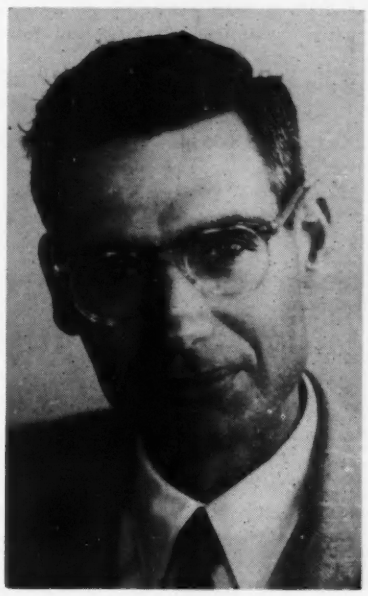
Studies made during the middle and late 1930's in Florida showed that both spray and soil applications of manganese increased the yield, firmness, weight, size, color and sugar content of citrus fruit and decreased the titratable acidity (1,2,10,11). Soil applications on the calcareous soils of the East Coast, however, usually have not been effective, so foliage sprays have generally been used.

The virgin soils of Florida are low in manganese. Peech (8) found that the exchangeable manganese content in most soils ranged from 0.25 to 5 lbs. per acre in the surface layer. In addition to the effect of low native manganese in the soil, it is well known that the soil pH greatly influences manganese availability and leaching.

Wander (13) found that about 70 percent of the manganese applied to a Lakeland sandy soil maintained at pH 5.8 was retained in the top 6 inches after 15 years of fertilization. Where the pH was allowed to drop to 4.3, only 1.7 percent of the manganese was retained.

Reitz (9) found that dormant sprays of neutralized manganese sulfate, manganese oxysulfate, manganous oxide, and manganese dioxide applied in equivalent amounts to manganese deficient grapefruit trees on calcareous soil kept the following spring flush free of manganese deficiency for only a few months. The oxides were less effective than the sulfate and oxysulfate.

Spring flush leaves sampled in August following the February spray contained 14, 12, 9, 7, and 4 ppm Mn respectively for manganese sulfate, manganese oxysulfate, manganous oxide, manganese dioxide, and unsprayed checks. Fourteen months after the sprays were applied trees in all plots were manganese deficient and the new spring flush leaves contained less than 4 ppm Mn in all plots. These results indicate that translocation of foliar-applied manganese in citrus is similar to that of zinc. Work with radioactive zinc has shown that when this metal is applied as a spray to citrus it does not move into the wood of the trees and hence is not stored (12).



IVAN STEWART

ACID-SOIL EXPERIMENT

A field experiment was established on Blanton soil near Bowling Green to compare the availability of manganese from three sources and two methods of application, with and without calcium chloride. The trees were 5-year-old Valencia orange on sweet orange rootstock. The topsoil pH was 6.1 and the 6-12-inch layer was pH 5.0. All the trees used showed manganese deficiency symptoms, and the leaves contained 8 ppm Mn. The experiment consisted of 2-tree plots in randomized blocks with 3 replications.

The materials tested were manganese sulfate, manganous oxide, and manganese dioxide. Manganese dioxide was used in the regular grind and in a fine grind which corresponded in fineness to the manganous oxide.

At the same time, a smaller trial was set up in the same grove to

[1]Florida Agricultural Experiment Stations Journal Series No. 980.

test the effectiveness of the same materials when applied in concentrated areas or piles with and without calcium chloride. Individual trees were treated in duplicate, using 8 piles per tree at the drip of the trees.

Leaves were sampled 11 weeks after treatment to assess the relative rates at which the different sources supplied manganese to the trees. Separate samples of old leaves and of spring flush leaves were taken in June, 1959.

Table 1. Manganese content of Valencia orange leaves from trees growing on acid soil and treated with three sources of manganese applied broadcast.

Manganese Source	Lbs. $MnSO_4$ or Equivalent per tree	Leaf symptoms on summer flush	Manganese	
			Spring flush[1] ppm	Old leaves[1] ppm
None	—	Chlorotic	23	18
Manganese sulfate	5	Green	463	173
Manganous oxide (MnO)	5	Chlorotic	22	23
Manganese dioxide (MnO_2) Regular grind	5	Chlorotic	17	17
Manganese dioxide (MnO_2) Fine grind	5	Chlorotic	17	17
Manganese sulfate	2	Green	114	73
Manganous oxide (MnO)	2	Chlorotic	17	25
Manganese dioxide (MnO_2) Regular grind	2	Chlorotic	17	20
Manganese dioxide (MnO_2) Fine grind	2	Chlorotic	16	18

[1] Treatments applied October, 1958; leaves sampled June, 1959.

In September, 1959, samples of four different ages of leaves were taken from representative treatments and a careful check for manganese deficiency symptoms was made on each tree. Leaf manganese was determined by the tetramethyldiaminodiphenylmethane ("methane base") method of Cornfield and Pollard (3).

Broadcast application of manganese sulfate at both 2 pounds and 5 pounds per tree completely corrected the symptoms of manganese deficiency on all trees receiving these treatments. The spring flush leaves sampled in June, 1959, contained an average of 114 ppm for the 2-lb. rate, and 463 ppm Mn for the 5-lb. rate, as compared with 23 ppm for the untreated checks

None of the manganese oxides corrected the manganese deficiency symptoms, and the leaves from trees receiving the oxides contained about the same amount of manganese as those from the checks.

Mixing 5 lbs. manganese sulfate with 3 lbs. calcium chloride and applying in 8 concentrated piles at the drip of the trees resulted in extremely high uptake of manganese. Leaf samples taken on January 7, 1959, 11 weeks after application, contained 900 ppm Mn, and showed dark brown rust-like spots symptomatic of manganese toxicity.

Leaves from trees receiving 5 lbs. manganese sulfate alone applied in 8 piles contained only 12 ppm Mn, and trees receiving 5 lbs. manganese sulfate broadcast contained 29 ppm, as compared with 8 ppm Mn in the leaves from the check trees. Calcium chloride applied with the manganese oxides gave small increases in leaf Mn as compared with the oxides alone, but leaves from all oxide treatments contained less than 29 ppm Mn.

Leaves sampled in June, 1959, from trees receiving 5 lbs. manganese sulfate mixed with calcium chloride and applied in piles contained 1065 ppm Mn in the spring flush and about the same in the old leaves (Table 2). Application of 5 lbs. manganese sulfate alone in piles resulted in 410 ppm Mn in the spring flush leaves and 140 ppm in the old leaves.

These values are comparable to those in leaves from trees treated with 5 lbs. manganese sulfate applied broadcast. Calcium chloride applied in piles with the manganese oxides gave small increases in manganese uptake as compared with the oxides applied alone, but both failed to correct the manganese deficiency.

The September sampling, in agreement with the earlier sampling, showed that manganese sulfate resulted in much higher leaf manganese levels than either of the manganese oxides (Table 3). Manganese sulfate mixed with 3 lbs. of calcium chloride and applied in 8 piles gave the extremely high concentration of 1613 ppm Mn in the old leaves.

Many of these leaves still showed the brown spotting typical of manganese toxicity. The toxicity symptoms did not appear on the 1959 spring flush, even though these leaves were very high in manganese.

CALCAREOUS-SOIL EXPERIMENT

A field experiment was established near Fort Pierce for the purpose of finding a method of correcting manganese deficiency in citrus on calcareous soil by ground application. This was a Parkwood soil of pH 7.7 in both top soil and subsoil and had a high concentration of marl 18 to 24 inches below the surface of the beds. The trees were mature Valencia orange and Marsh grapefruit on sour orange rootstock and were growing on single beds. All trees used showed moderately-severe manganese deficicency.

Table 2. Manganese content of Valencia orange leaves from trees growing on acid soil and treated with three sources of manganese applied in 8 concentrated piles with and without calcium chloride[1].

Manganese Source	$CaCl_2$ lbs.	Leaf symptoms on summer flush	Manganese	
			Spring flush ppm	Old leaves ppm
Manganese sulfate	3	Green	1065	1075[2]
Manganese sulfate	—	Green	410	140
Manganous oxide (MnO)	3	Chlorotic	27	34
Manganous oxide (MnO)	—	Chlorotic	19	22
Manganese dioxide (MnO_2) Fine grind	3	Chlorotic	21	27
Manganese dioxide (MnO_2) Fine grind	—	Chlorotic	19	22
None	—	Chlorotic	23	18

[1] Each pile covered about one square foot. Treatments applied October, 1958, and leaves sampled June, 1959.
[2] Manganese toxicity symptoms appeared on old leaves within 11 weeks after application.

Table 3. Manganese content of leaves of different ages from Valencia orange trees growing on acid soil and treated with three sources of manganese.

Manganese Source	$MnSO_4$ or Equivalent lbs/tree	$CaCl_2$ lbs./tree	How Applied	Manganese			
				New Fall Flush ppm	Summer Flush ppm	Spring Flush ppm	Old Flush ppm
None	—	—	—	10	9	17	20
Manganese sulfate	5	—	Broadcast	72	403	413	193
Manganese oxide (MnO)	5	—	Broadcast	23	10	20	22
Manganese dioxide (MnO_2)	5	—	Broadcast	9	6	17	20
Manganese sulfate	5[2]	—	Broadcast	24	42	120	80
Manganese sulfate	5	3	8 piles	110	230	763	1613
Manganese sulfate	5	—	8 piles	124	225	420	129

[1] Treatments applied October, 1958; leaves sampled September, 1959.

Some of the treatments were applied to individual trees in duplicate, while others were applied in triplicate. Manganese sulfate was applied with and without calcium chloride and/or wettable sulfur in concentrated areas or piles of about 1 square foot each. Manganese sulfate was also applied with sodium chloride and sulfur, and with the manganese chelate of diethylene triamine pentaacetic acid (MnDTPA).

MnDTPA was also tested in piles with soda ash. The orange trees were treated in the summer of 1958, and the grapefruit trees were treated in January, 1959. Spring flush leaves were sampled in July, 1959, and the trees were carefully checked for manganese deficiency symptoms in September, 1959.

The spring flush leaves from orange trees given manganese sulfate alone, either broadcast or in concentrated piles, averaged about 10 ppm higher in Mn than leaves from untreated check trees a year after treatment (Table 4). These treatments, however, failed to correct the symptoms of manganese deficiency.

Manganese sulfate applied in piles with calcium chloride, with or without sulfur, gave much higher levels of leaf manganese than manganese sulfate plus sulfur only, and completely corrected the symptoms of manganese deficiency. Application of the mixtures in 10 piles usually was a little more effective than application in 5 piles.

Trees given manganese sulfate in piles with wettable sulfur showed manganese deficiency, and had leaf manganese contents only slightly higher than those receiving manganese sulfate alone. The pH of the surface 6 inches of soil in the sulfur-treated areas varied, but was as low as 6.0 one year after 10 lbs. of wettable sulfur was applied in 5 piles.

Application of MnDTPA in piles with soda ash (Na_2CO_3) at the rate of 100 grams Mn per tree resulted in very little uptake of manganese and failed to correct manganese deficiency symptoms. Application of 5 lbs. manganese sulfate with MnDTPA at the rate of 100 grams or less of Mn per tree also failed to correct the deficiency.

The treatments applied to the grapefruit trees consisted of 5 lbs. manganese sulfate in 5 piles per tree. Leaves were sampled 6 months later. Where 5 lbs. wettable sulfur was added, the leaves contained 56 ppm Mn; with 5 lbs. sulfur plus 5 lbs. calcium chloride, 180 ppm; and with 5 lbs. calcium chloride without sulfur, 270 ppm.

All of the trees receiving these treatments showed no manganese deficiency 8 months after treatment. However, trees receiving 5 lbs. manganese sulfate alone were manganese deficient at this time.

DISCUSSION

These studies indicate that manganese applied to the Blanton soil in the form of manganese sulfate was readily taken up by citrus. Uptake was roughly proportional to rate of application. As in the zinc studies reported previously (6,7), application of calcium chloride with the manganese sulfate greatly increased the uptake of manganese. The cause of the increased uptake of Mn has not been determined and will require additional study.

The low uptake of Mn from both of the oxides has been clearly demonstrated. The experiment was not carried out on a Lakeland sand, where much of the citrus is grown, and the rootstock was not the one typically used on the lighter soils. However, the manganese sulfate was found to be readily taken up

as it is on other acid soils.

It would not be expected, therefore, that the manganese oxides would react very much differently on other acid soils where citrus is grown. The lack of uptake of manganese from the oxides is probably due to their lack of solubility, which prevents their movement into the root zone.

Studies by Fiskel and Mourkides (4) indicated that both manganous oxide and manganese dioxide were available sources of Mn for tomatoes. Their studies were carried out in pots where the oxides were mixed in the soil, suggesting that if these forms of manganese were mixed in the soil they might be available to citrus. However, mixing of the fertilizer with soil other than by shallow disking as was done in the acid-soil test reported here, is not practical in normal grove operations.

It is entirely possible that manganese oxides may eventually become available to citrus; again, however, this is not a practical consideration, since immediate correction of the deficiency is usually desired. If the soil pH is maintained near 6.0 the manganese sulfate will not readily leach from the soil, and thus will provide a continuing supply of manganese for the trees. In all probability manganese sulfate is changed to one or more of the manganese oxides in the soil but much of this happens after it has reached the root zone.

Manganese sulfate applied to calcareous soil is not readily available to citrus trees. This has been known for many years and was confirmed by the data in this report. However, it was believed that if localized areas under the trees were acidified with sulfur, manganese sulfate applied to these acidified spots would be readily available.

This was true to only a limited extent, even though the soil pH was reduced to as low as 6.0 by the sulfur. A fairly small increase in leaf manganese was obtained, and the trees were green 8 months after application; however, they were chlorotic 14 months after treatment.

Several months are required for the sulfur to be oxidized and to acidify the soil. During this time, most of the manganese sulfate is probably transformed to an insoluble oxide. Leeper (5) found that the manganese ion is slowly oxidized by bacteria to a higher oxide, the process taking about 3 or 4 days.

The high uptake of manganese by citrus growing on calcareous soil from mixtures of manganese sulfate and calcium chloride is in agreement with results reported in this paper for acid soil and with earlier reports (6,7) on the availability of zinc.

Sufficient studies have not been made to determine if the chloride ion is primarily responsible for the increased uptake of Mn and Zn. However, the work with zinc showed that the nitrates of calcium and sodium failed to give the same responses as their chlorides. In the present study, a mixture of sodium chloride, wettable sulfur and manganese sulfate applied in 10 piles under the trees also resulted in high leaf manganese.

The high levels of manganese in the leaves of both oranges and grapefruit trees growing on calcareous soil given soil treatments of manganese sulfate and calcium chloride in concentrated piles demonstrates the effectiveness of this method in supplying abundant amounts of manganese to the trees.

The leaf manganese resulting from these treatments was far higher than that obtained by Reitz (9) from manganese foliage sprays. In fact, the dormant spray treatments in his study failed to supply enough manganese to the next spring flush to raise its manganese content above the commonly-accepted deficiency level of 15 ppm Mn. In contrast to this, the manganese content of leaves taken a full year after treatment in this trial was more than 100 ppm for many of the soil treatments.

Although this report covers work in only one grove on calcareous soil, similar results have been obtained with manganese sulfate — calcium chloride — wettable sulfur mixtures applied in piles in other East Coast groves.

SUMMARY

Field studies were made to compare the availability of three sources of manganese for citrus when applied to acid soil, and to develop an effective method of applying manganese to citrus growing on calcareous soil. On acid soil, broadcast application of 2 and 5 pounds of manganese sulfate per tree to manganese deficient 5-year-old orange trees resulted in high levels of manganese in leaves sampled 8 and 11 months later, and correction of the deficiency symptoms.

Equivalent amounts of manganous oxide and manganese dioxide showed no increase in leaf manganese over the untreated check trees, and failed to correct the manganese deficiency. Application of 5 lbs. manganese sulfate with 3 lbs. calcium chloride in 8 concentrated areas or piles of about one square foot area at the drip of the trees resulted in 900 ppm Mn in the leaves only 11 weeks after treatment, and more than 1000 ppm Mn in both spring flush leaves and old leaves sampled 5 months later. Calcium chloride mixed with the manganese oxides produced only very small increases in leaf manganese.

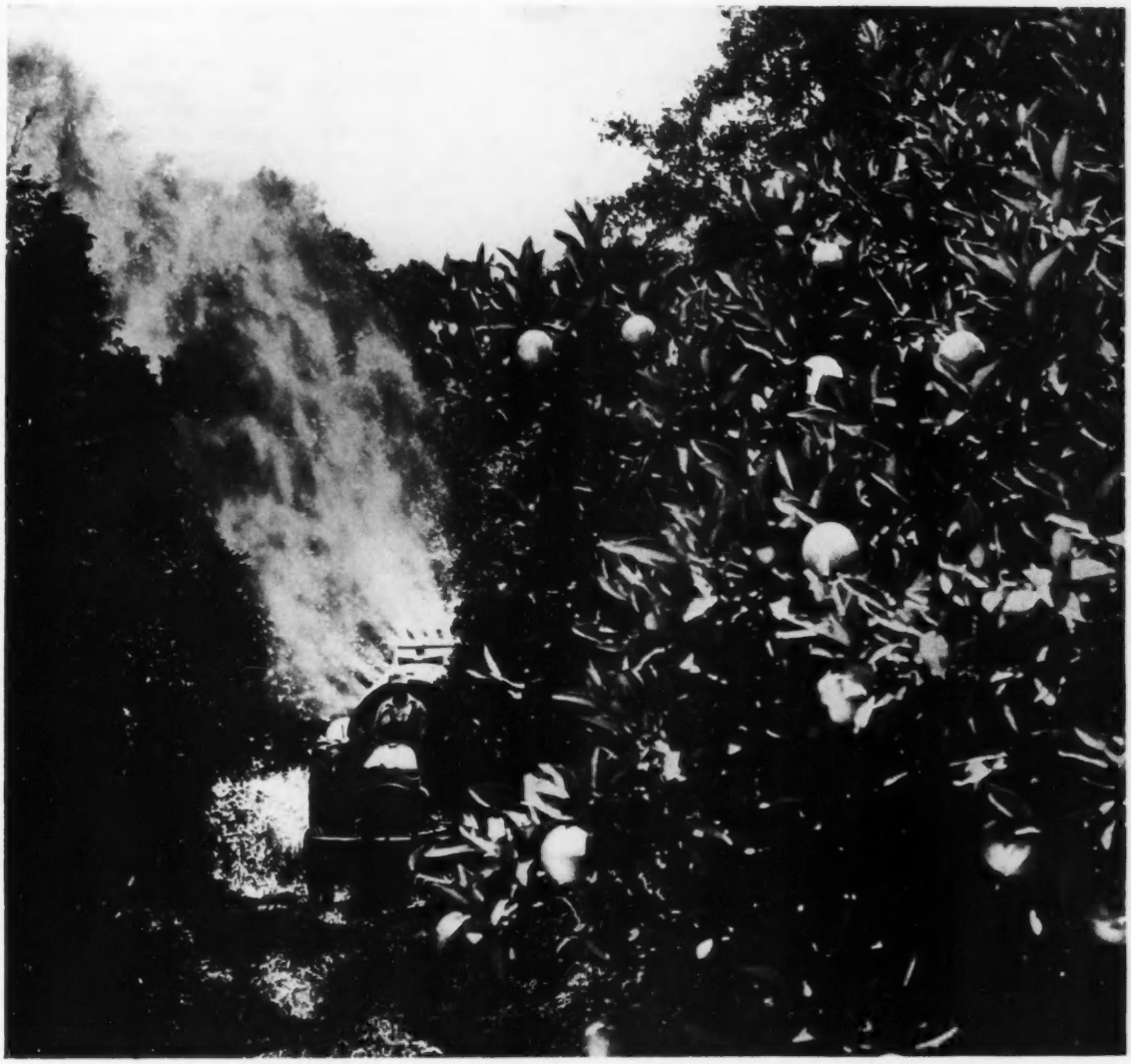
On calcareous soil, five pounds of manganese sulfate, applied broadcast or in concentrated piles to manganese-deficient orange trees increased the leaf manganese only slightly over the untreated checks, and failed to correct the deficiency

(Continued on page 15)

Table 4. Manganese content of Valencia orange leaves from trees growing on calcareous soil after soil application of manganese sulfate alone and in combination with other materials in concentrated piles.

Treatment per tree					
$MnSO_4$ lbs.	$CaCl_2$ lbs.	W.S. lbs.	No. of piles[1]	Leaf symptoms on summer flush	Manganese ppm[2]
None	—	—	—	Mn deficient	14
5	—	—	5	Mn deficient	25
10	—	—	5	Mn deficient	24
10	—	—	10	Mn deficient	23
5	—	—	Broadcast	Mn deficient	24
5	—	5	5	Mn deficient	30
5	—	5	5	Mn deficient	27
5	—	10	5	Mn deficient	25
5	—	10	10	Mn deficient	29
10	—	10	10	Mn deficient	29
3	3	—	5	Green	70
5	5	—	7	Green	153
5	5	—	10	Green	192
3	3	5	5	Green	65
5	5	5	5	Green	93
5	5	10	10	Green	122
5	5	5	10	Green	188
5	5	5	7	Green	260
5	5 NaCl	10	10	Green	383

[1] Each pile about one square foot in area.
[2] Spring flush sampled July, 1959; treatments applied summer, 1958.



CONTROL ALL MAJOR CITRUS MITES WITH TRITHION®

No other miticide gives you the combination of advantages you get with TRITHION. It controls all citrus mites, even mite eggs; gives quick kill; and has long-lasting action. TRITHION can be used on bearing trees up to 14 days before harvest. It's available as a dust or spray. Ask your dealer for TRITHION, or write to Stauffer Chemical Company, Tampa, Florida, for further information.

Research, service and products of highest quality have made Stauffer one of America's largest specialists in farm chemicals. Look for and buy Stauffer brand INSECTICIDES, FUNGICIDES, WEED KILLERS, MITICIDES, SEED PROTECTANTS, FUMIGANTS, GROWTH REGULATORS, GRAIN PROTECTANTS, DEFOLIANTS.

Stauffer CHEMICALS SINCE 1885

®TRITHION is Stauffer Chemical Company's trade-mark (registered in principal countries) for O, O-diethyl S-p-chlorophenyl thiomethyl phosphorodithioate, an insecticide-miticide.

SMALL POWER TOOLS FOR PRUNING CITRUS

(Cntinued from page 7)

must be treated with respect and care; however, just as is the case with such dangerous materials as parathion they will continue to be used because with proper precautions they can be operated safely and effectively. As for all high speed circular saws, this tool should never be operated without a face guard to protect the eyes from sawdust and small pieces of wood.

Compressed Air Tools

The compressed air circular saw is run by a small air motor mounted just behind the blade on the end of a hollow tube. Air coming through the tube operates the air motor that turns the blade. The primary mechanical difficulty lies in sand getting into the motor and ruining the vanes and bearings. The motor is lubricated by an oiler attached between the air outlet of the compressor and the hose. The flow of oil must be adjusted properly. Excessive as well as insufficient oil can be damaging.

The air saws themselves cost about the same as the electric type but for comparable power and cutting ability the cost of an adequate compressor is appreciably more than for a generator.

The main advantage of the air equipment is its light weight (5-½ to 7-½ pounds) and good balance. Also, the motors are simple to repair, and there is no long drive shaft and gear head to cause trouble, as it is the case with the electric model. Easily added extension tubes are available.

The Kwik-Kut circular air saw is one of this type. The handle containing the air-control lever is swiveled, allowing the saw to be easily turned, and a two-speed air flow control permits both moderate or high speeds. Like the electric model the blade continues to revolve after the power is shut off, which poses a hazard. Also, there is no safety feature to prevent the saw from being turned on accidently.

Two motor sizes are available and each will handle both 8-inch and 6-inch blades. The larger motor is more powerful. having about the same speed and power as the electric model, while the smaller requires less air.

The Ackley circular air saw is another fine tool that operates at a lower speed (5000 r.p.m.) than the Kwik-Kut, but because of the large air volume used it is very powertul. It is the safest of all the circular high speed saws with unprotected heads because the blade stops revolving soon after the power is cut off and the control lever can be locked either on or off. The shaft can be quickly extended up to 12 feet; however, its is somewhat unwieldly at this height. It will take 9-, 8- and 6-inch blades and an adjustable-angle head is available. For pruning citrus, it is debatable as to whether the added expense of the latter is justified.

Also available is an Ackley circular saw with a smaller motor and a two-speed air flow control regulator for both 5000 r.p.m. and 12000 r.p.m. speeds. It has a 5-foot tube and the same safety features as the large model. but no provisions for extension tubes.

All high speed circular saw blades must be kept sharp. In heavy cutting daily sharpening is required. For lighter touch-up work and rehedging the blades may be used up to a week without sharpening. Sharpening must be done by machine to keep the blades balanced.

Another recent development in the air tool line is the Ackley chain saw. This tool has the same air flow controls and tubular aluminum extensions as the large Ackley circular saw. In fact, the control units can be interchanged in a matter of seconds without tools.

The chain saw is 9-inches long and can handle much larger limbs than the circular saws. It is narrow, which permits its use in narrow crotches, and its relatively high speed produces a saftisfactorily smooth cut. Obviously it cannot be used for hedging.

The only air tool comparable to the above air chain saw is the Miller-Robinson reciprocating saw. This saw cuts more slowly than the chain type, and it is limited to smaller limbs. On the other hand it makes a somewhat smoother cut, will fit into the narrowest of crotches and requires much less air.

The remaining type of air tool is the lopper, of which there are a large number of makes and models. They are widely used in Florida and too commonplace to warrant a detailed description. Loppers are particularly adapted to the selective removal of branches but they are limited to the moderate sizes. Attempts to use them on the larger limbs results in an undersirable crushing at the edges of the cut. These tools are also used for hedging, but because only selective cuts can be made the speed of the operation is relatively slow and costly.

Power Requirements

A guide to selecting power sources has recently been published by Jutras, et al. (2), but it warrants mention here that one should not try to economize on the power unit. It is miserable and costly to operate underpowered equipment and the power source tends to decrease in efficiency with age.

For operating one of the circular electric saws (750 watts), a 1000 watt generator is suggested and for two saws one of 2000 watt capacity is preferred.

While some of the air tools use less air than others, more low consumption tools are generally used at one time. Two-stage compressors ranging from 20 to 30 c.f.m of free air to 150 to 170 p.s.i are preferred for operating the circular and chain air saws, which are voracious consumers of air. The most common compressor unit in use in Florida is a 45 c.f.m. (piston displacement) single stage type. This will satisfactorily operate a series of the loppers or reciprocating saws or one large circular saw.

Summary

There is a great variety of small power pruning tools available but many are limited in their versatility. There is no ultimate tool but the

most versatile is the high speed circular saw (either electric or air). It must be used carefully by trained men wearing protective face guards. In choosing between the air and electric models of this type it is primarily a question of the light weight and simple construction of the air type versus the lower cost of the electric.

When selecting a power source one should tend toward overpowering rather than just meeting the requirements of the equipment.

Literature Cited

1. Prosser, D. S. 1953. Hedging machine for citrus groves. Univ. of Fla. Agr. Expt. Sta. Bul. 519.

2. Jutras, P. J. and A. H. Krezdorn. 1959. Guide to the selection of air compressors and electric generators to operate power pruning tools. The Citrus Industry 40: (10): 18, 25, and 26.

3. Fla. Ind. Commission. Safety Div. Bul. D.I.S. 672.

SOIL APPLICATION OF MANGANESE FOR CITRUS

(Continued from page 12))

symptoms. Trees given 5 lbs. manganese sulfate with 5 or 10 lbs. wettable sulfur in piles were green 8 months after treatment but manganese-deficient 6 months later.

High leaf manganese levels were obtained when a mixture of 5 lbs. manganese sulfate and 5 lbs. calcium chloride was applied in 5 or 10 piles per tree, with or without wettable sulfur, and the manganese deficiency was corrected. A mixture of 5 lbs. sodium chloride, 10 lbs. wettable sulfur, and 5 lbs. manganese sulfate applied in 10 piles per tree also resulted in high manganese uptake.

LITERATURE CITED

1. Camp, A. F. and Walter Reuther. 1938. Studies on the effect of zinc and other unusual mineral supplements on the growth of horticultural crops. Ann. Report, Fla. Agr. Exp. Stn., pages 147, 148.

2. Camp, A. F. and Walter Reuther. 1939. Studies on the effect of zinc and other unusual mineral supplements on the growth of horticultural crops. Ann. Report., Fla. Agr. Exp. Stn., pages 147, 148.

3. Cornfield, A. H. and A. G. Pollard. 1950. The use of tetramethyldiaminodiphenylmethane for the determination of small amounts of manganese in plant material and soil extracts. Jour. Sci. Food & Agr. 1; 107-109.

4. Fiskel, J. G. A. and G. A. Mourkides. 1955. A comparison of manganese sources using tomato plants grown on marl, peat and sand soils. Plant and Soil VI, No. 4, pages 313-331. August, 1955.

5. Leeper, G. W. 1947. The forms and reactions of manganese in the soil. Soil Science 63: 79-94.

6. Leonard, C. D., Ivan Stewart, and George Edwards. 1958. Soil application of zinc for citrus on acid sandy soil. Proc. Fla. State Hort. Soc. 71: 99-106.

7. Leonard, C. D., Ivan Stewart, and George Edwards. 1956. Effectiveness of different zinc fertilizers on citrus. Proc. Fla. State Hort. Soc. 69: 72-79.

8. Peech, Michael. 1938. Citrus soils investigations. Ann. Report, Fla. Agr. Exp. Stn., page 140.

9. Reitz, H. J. 1956. Supplying manganese requirements of citrus. Ann. Report, Fla. Agr. Exp. Stn., pages 181-183. (Also unpublished data.)

10. Roy, W. R. 1937. The effect of soil applications of manganese on the mineral composition of foliage and maturity of fruit in citrus. Proc. Fla. State Hort. Soc. 50: 29-37.

11. Skinner, J. J., G. M. Bahrt, and A. E. Hughes. 1934. Influence of fertilizer and soil amendments on citrus trees, fruit production and quality of fruit. Proc. Fla. State Hort. Soc. 47: 9-17.

12. Stewart, Ivan, C. D. Leonard and George Edwards. 1955. Factors influencing the absorption of zinc by citrus. Proc. Fla. State Hort. Soc. 68: 82-88.

13. Wander, I. W. 1954. The total manganese, copper and zinc content of soils used for citrus production in Florida. Proc. Soil Science Soc. Fla. 14: 27-36.

SNIVELY GROVES, INC. AT N.C.A.

Winter Haven, Florida — Sales headquarters during the convention will be at the Americana Hotel starting Saturday, January 16. Administrative headquarters will be at the Diplomat Hotel, 3516 South Ocean Drive, Hollywood, Florida, which is located on the beach seven miles directly north of the Americana.

Some Considerations Regarding Setting Distances*

ZACH SAVAGE
AGRICULTURAL ECONOMIST
FLORIDA AGRICULTURAL
EXPERIMENT STATION

Citrus cost and returns studies by the Florida Agricultural Extension Service and Agricultural Experiment Stations include data by age and setting distances for oranges and grapefruit trees. These studies began in 1931 but most of the data in this paper include the 17 seasons of 1940 to 1957. These data include groves that varied from those with all orange trees to those with all trees grapefruit. In many groves most trees were orange with a minority of grapefruit trees. Such groves are commonly referred to as "mixed" groves. Groves of the groups included in this paper are comparable in this regard with approximately 30 percent of the trees grapefruit.

In order to present specific data and make comparisons, this paper is concerned with groves having fewer than 50 trees set per acre (average 47) and groves with 90 to 99 trees per acre (average 94). These two groups of groves are used here for comparisons of single- and double-set groves. These data include tree ages of 5 through 49 years from time of setting in the grove. Data are insufficient for tree ages of 50 years and older for the determination of trends for these ages.

Yields increased substantially through 49 years of age with single-set trees. Limited amounts of data at hand indicate increases from 50 through 74 years of age for this group but the rate of increase was less for trees older than 49 years. Yields of the double-set or closely spaced group (90 to 99 trees per acre) decreased after 24 years from 358 boxes per acre at ages 20 through 24 years to 215 boxes at ages 45 through 49 years. The indications are that yields in groves with 90 to 99 trees per acre decrease at a more rapid rate after they reach 50 years of age than prior to that time. (See Table 1.)

"Estimates of combination" column of Table 1 are estimates made from actual data at hand such as that contained in the second and third columns of this table. Such columns are presented in Tables 1 and 2 in order to conserve space and prevent repetition. Discussion concerning these columns begins on page 3. There are no groves in Florida handled in the "combination" manner that are of bearing age. Hence, there are no records of such for use at this time.

In the group of under 50 trees per acre, yields increased each 5-year period through the group 45 through 49 years of age when the average was 355 boxes per acre. Total boxes produced for all ages of 5 through 49 years was 10,315 boxes. (See Table 2). This was an annual average of 229 boxes per acre. The group with 90 to 99 trees per acre increased in yield through age 24, then decreased through age 49. The total number of boxes produced during ages 5 through 49 years was 12,310, or an annual yield of 274 boxes. This group produced 1,995 boxes more than wide spacing, or 45 boxes more per acre annually.

Production of the double-set trees at ages 5 through 14 years was double the production of the wide spacing. Total production in favor of the double setting continued to increase through the 34th year of age when it amounted to 3,175 boxes or 72 percent more fruit. Total production continued to favor the double setting through the 49th year when it amounted to 1,995 boxes more per acre.

The operating costs for the 90-to-99-tree-per-acre group were higher per acre and per box than the under-50-trees-per-acre group. The comparisons for the averages of each of the two groups over the 17 year period are shown in Table 3.

THE COMBINATION METHOD

Up to this point the comparison has been between regular spacing and double-set groves from actual data of the records cited. In each case the number of trees remained as originally set. This means no trees were removed to relieve crowded conditions. There were a few groves during the latter part of the 1940-57 period where hedging was done for a few seasons. However, such hedging was not sufficiently widespread among these groves to affect these results very materially.

These records do not include groves that were double-set with alternate trees progressively pruned back in order to give needed space to the other growing trees left to spread and grow permanently without interruption. Such a method we have elected to call a "combined"

Continued on page 18

Table 1. Average Yield of Mixed Citrus in Boxes Per Acre Per Season, 1940-57

Age Range	Under 50 trees per acre	90-99 trees per acre	Estimates of combination
5 - 9	71	142	142
10 - 14	130	260	260
15 - 19	179	336	339
20 - 24	212	358	362
25 - 29	235	325	345
30 - 34	259	300	334
35 - 39	295	275	330
40 - 44	327	251	327
45 - 49	355	215	355

*This paper was presented at the Florida State Horticultural Society meeting in Miami, October 29, 1959.

SOME CONSIDERATIONS REGARDING SETTING DISTANCES

Continued from page 16

or "combination" method. When this system of grove management is followed, alternate trees in the double-set row are progressively pruned back until the bearing surface is reduced to a minimum and then the trees are removed to another grove or destroyed.

The combination method makes intensive use of the land — the same as the double-set method — until such time as alternate trees are removed. Double-set bearing groves have a higher production cost per acre than groves with wide distances as has just been cited. However, the higher yields obtained on double-set groves, where the trees are either too small or are pruned back to prevent crowding, partially offsets the tdded cost per acer. This results in a per-box cost, on double-set groves slightly higher than on widely spaced or single-set trees.

By combining data on single- and double-set groves with estimates for yields and costs on the alternate trees after the process of pruning back has been started, data for the combination method are estimated. The alternate trees must be pruned back as necessary in order to make ample room for the trees to be left permanently. By or before the 39th year, there would be little left of the alternate trees, which would enable the grove owner or operator to remove these trees without feeling that he was removing trees that would seriously reduce fruit yields at that time. However, it is difficult for the owner to make up his mind to remove alternate trees that have not been pruned back as they begin to crowd.

In the event pruning back is not practiced, alternate trees in a double-set grove should be removed at approximately 25 years of age. This would necessitate considerable will-power and would reduce yields approximately 50 per cent or one-half for the first season after such removal. Yields would continue to be lower than the yield for the season just prior to the removal of alternate trees for several seasons following such removal of trees not progressively pruned back.

The combination method would have yields that are identical to those of the double-set grove during the first 15 years after setting. After that time, progressively cutting back the alternate trees in the combination method would result in yields higher than those in the regular double-set grove. This would continue to be true through the 39th year or until the alternate trees were removed.

Yields after the removal of alternate trees would be identical with those of the regular single-set spacing. The combination method would have higher yields than the double-set grove during the 25 seasons from ages 15 through 39 years, due chiefly to progressively cutting back alternate trees to prevent crowding or interlocking of limbs from the permanent trees. This would result in more leaf and bearing surface; and, consequently, more fruit would be produced.

After 24 years of age the trees of the combination method would continue to show increases in yields. Actually, however, the permanent trees would increase in yield and the alternate trees decrease. At this age the yield per acre of the double-set groves would reach its highest point — 358 boxes. The yield of the single-set groves at 24 years of age was still increasing and at this age had a total production of 2,555 boxes less than the combination method. (See Table 2). Also at this age the total net returns per acre of the combination method would be considerably more than the single-set and slightly more than the double-set method. (See Tables 4 and 5).

A comparison of production for the entire period of ages 5 through 49 shows the yield of the permanent trees increasing in the combination method at the same rate as the single-set method. The combination method would produce 3,655 boxes more per acre through these ages than the single-set method. At tree ages of 50 years and older this spread in favor of the combina-

Table 2. Cumulative Production in Boxes Per Acre With Comparisons

Age Range	Under 50 trees per acre	90-99 trees per acre	Combination	Advantage of combination over: Under 50 trees per acre	Advantage of combination over: 90-99 trees per acre
5 - 9	355	710	710	355	None
5 - 14	1005	2010	2010	1005	None
5 - 19	1900	3690	3705	1805	15
5 - 24	2960	5480	5515	2555	35
5 - 29	4135	7105	7240	3105	135
5 - 34	5430	8605	8910	3480	305
5 - 39	6905	9980	10560	3655	580
5 - 44	8540	11235	12195	3655	960
5 - 49	10315	12310	13970	3655	1660

Table 3. Yield, Cost and Return Data for Single- and Double-Set Groves, 1940-57

Yield in boxes per acre	Trees per Acre: Under 50 Single Set 229 — Acre	Box	90-99 Double Set 274 — Acre	Box
Operating cost	$102.56	$ .45	$177.68	$ .65
Returns from fruit	265.90	1.16	317.32	1.16
Net above operating cost	163.34	.71	139.64	.51
Advantage of group in net	23.70			

Table 4. Average Net Returns Per Acre Per Season, 1940-57

Age Range	Under 50 trees per acre	90-99 trees per acre	Estimates of combination
5 - 9	$ 41	$ 75	$ 75
10 - 14	100	192	192
15 - 19	135	264	268
20 - 24	158	266	271
25 - 29	169	194	216
30 - 34	182	133	171
35 - 39	208	78	139
40 - 44	229	41	229
45 - 49	247	14	247

Table 5. Cumulative Net Returns Per Acre With Comparisons

Age Range	Cumulative Net Returns: Under 50 trees per acre	90-99 trees per acre	Estimates of Combination	Advantage of Combination over: Under 50 trees per acre	Advantage of Combination over: 90-99 trees per acre
5 - 9	$ 207	$ 376	$ 376	$ 169	None
5 - 14	708	1333	1333	625	None
5 - 19	1385	2655	2671	1286	$ 16
5 - 24	2176	3985	4024	1848	39
5 - 29	3023	4954	5104	2081	150
5 - 34	3931	5619	5957	2026	338
5 - 39	4970	6006	6650	1680	644
5 - 44	6116	6212	7796	1680	1585
5 - 49	7350	6284	9030	1680	2746

tion method would remain the same throughout the remaining life of the trees.

After the removal of alternate trees in the combination method, the spread in total production in excess of the single-set method would remain the same and be equivalent to the total fruit produced on the alternate trees — 3,655 boxes per acre. Actually after alternate trees are removed, the combination method is the same as the single-set method.

Prior to the age of 49 years the double-set groves had been decreasing in yield for 25 years — from 336 boxes per acre down to 215. However, the total production from trees of ages 5 through 49 years in the double-set groves was 1,995 boxes more than the single-set. Also, the closeness of the trees in the double-set groves resulted in the trees declining rapidly at age 49; and the indications were that they would be out of commercially feasible production within a few seasons. At this age, trees of the single-set and combination methods would still be in good condition with yields increasing at the same rate.

Table 6. Yields, Costs and Returns for the Three Settings, 1940-57

Yield in boxes per acre	Trees per Acre: Under 50 Single Set 229		90 to 99 Double Set 274		Combination 310	
	Per Acre	Per Box	Per Acre	Per Box	Per Acre	Per Box
Operating cost	$102.56	$ .45	$177.68	$ .65	$159.43	$ .51
Returns from fruit	265.90	1.16	317.32	1.16	360.12	1.16
Net above operating cost	163.34	.71	139.64	.51	200.69	.65

Comparisons of average results of the three methods outlined over the period at tree ages of 5 through 49 years are shown in Table 6. The combination method averaged highest in yield, returns and in net returns per acre. This method was intermediate in operating cost per acre.

Advantages favorable to the combination method would be increased with higher costs for good citrus land, increased scarcity of such land, interest on land investment included in production costs, and/or a charge included as land rent. In addition, the complete story has not been told at the end of 49 years. The double-set trees barely pay for their keep at ages 45 through 49 years, while the single-set and the combination methods are in good condition and profitable at this time.

However, the advantages of the combination method over the single-set grove have been realized by the time the alternate trees are removed. After the removal of the alternate trees the performances of the combination and single-set groves would be identical. Added production and profits on these two methods at 50 years of age and older would be added advantages over the double-set method.

In this paper only three methods involving two setting distances have been considered. Data for other setting distances would, no doubt, show similar trends favorable to a large number of trees per acre somewhat proportional to those here considered when under comparable treatment at similar ages. However, the most favorable results would be obtained in close spacings only when provisions were made to prevent trees from crowding each other, and thus maintaining the maximum leaf or bearing surface.

Some growers have recently double-set young groves with the idea of carrying out the combination method in their management of such groves. Other growers have stated they expect to make new plantings within the near future and will use the combination idea. However, the long productive life of citrus trees will mean that several years will elapse before conclusions can be drawn as to the results obtained.

The success of the combination method hinges very largely on attaining the maximum leaf surface on the trees to be left permanently and at the same time leaving as much leaf surface as possible on the trees that are to be removed without permitting these trees to interfere with the permanent trees.

E. J. HUGHES NAMED DIVISION SALES MANAGER OF SNIVELY GROVES

E. J. Hughes, formerly Manager of the New York Branch of Safeway Brands Buying Division of Safeway Stores, Inc., has been named a Division Sales Manager of Snively Groves, Inc., it has been announced by John A. Snively, Jr., President.

Mr. Hughes, who has been associated for twenty-five years with chain stores, both independent and national, will be principally concerned with chain store sales. He will be located at the firm's headquarters in Winter Haven, Fla.

Snively Groves is the grower, shipper and canner of a Cypress Gardens Brand of oranges, grapefruit and tangerines. The firm's line includes juices, sections, frozen concentrates, chilled sections and juice in addition to fresh fruit packing.

DEAN JOINS STAFF AT QUINCY STATION FOR TOBACCO WORK

Dr. C. E. Dean has joined the North Florida Experiment Station to conduct tobacco breeding work under a grant from the Florida-Georgia Leaf Tobacco Growers' Association.

The growers' grant permits the use of $10,000 a year for a two-year period. Dr. Dean's goal will be to obtain good market quality combined with resistance to blackshank disease, root-knot and root-rot nematodes, and blue mold disease.

Dr. Dean is a native of Monticello, Florida, and a graduate of the University of Florida. He completed graduate work at North Carolina State College.

THE IMPORTANCE AND EARLY HISTORY OF THE TEMPLE ORANGE

Continued from page 3

the Fidelity Company's office that the records showed Mr. Wyeth purchased the place from a Mr. Ellinwood in 1888, and that six years previously, Mr. Ellinwood obtained it from a Mr. Phelps (1882).'

"The 'Parent' tree stands in regular order in a row of orange trees, and is alongside the driveway leading from the street to the cottage in the grove.

"John S. Hakes and others had noticed that the fruit on this particular tree was different from other oranges, but as he had made a practice of disposing of the fruit from this grove before the Christmas holidays, presumably the fruit from this tree was picked at the same time that the other oranges in the grove were harvested. Assuming that to be the case, the Temple orange had not fully matured, and as a consequence, its true quality not recognized.

"When Louis A. Hakes, took charge of the grove, he held the fruit until later in the season before marketing it. That practice allowed the oranges on the 'Parent" Temple tree to properly mature, and its superior quality was brought out.

"Subsequently, the fruit was shown to various people, and the owner made numerous trips to investigate rumors of the existance of similar fruit. However, he found no such fruit at that time.

"The owner next considered putting the fruit out as a new variety. Among others that he contacted was Mr. William Chase Temple, who had then returned to Winter Park to live on one of his grove properties, after serving for a period as General Manager of the Florida Citrus Exchange of Tampa, Florida.5/ In answer to the owner's questions, Mr. Temple stated that, in his opinion, the orange was a new variety, and of a quality that would justify its being propagated and offered to the citrus growers of Florida as such. He advised the owner to contact the Buckeye Nurseries of Tampa, Florida as the best medium through which to market the new variety.

"In accordance with Mr. Temple's advice, the owner began negotiations with the Buckeye Nurseries, and as a consequence, a contract was entered into with them, giving them exclusive rights to the fruit and budwood from the 'Parent' Temple tree for a number of years. This contract required the owner to use reasonable care in protecting the rights of the Buckeye Nurseries to the fruit and budwood.

"The question arose as to whether the tree was a seedling, or budded on some other root stock. At the suggestion of Mr. M. E. Gillett, head of the Buckeye Nurseries, the owner selected a root about the size of his thumb, sewed it off at its junction with the tree, brought the end up out of the ground, and staked it up that way. It produced grapefruit leaves.

"Another matter to be decided was whether or not the budwood from the 'Parent' tree would reproduce fruit of similar characteristics. Fortunately the owner found a tree producing similar oranges in a small grove in Winter Park. The owner was an acquaintance of John S. Hakes. He claimed that he took some budwood from the 'Parent' tree with the consent of John S. Hakes, who stated that he never gave such consent. However, the tree was producing fruit that could not be told from that produced by the 'Parent' tree. The Buckeye Nurseries secured control of the fruit and budwood from that tree.

"After the Buckeye Nurseries had placed the Temple orange trees on the market, two more trees of that variety were located near Oviedo, Florida, which the Buckeye people also secured control of. In endeavoring to get the history of the Oviedo trees, it developed that it was the general opinion of Oviedo people who knew about the trees, that a retired sea captain, who lived in or near that town, brought budwood from the Island of Jamaica, and that the two trees were budded with that budwood. The fruit produced by those two trees was referred to as 'Jamaica oranges.' As far as the owner of the 'Parent' tree knew, it was never proven that such was the case. However, if the above is a correct history of the Oviedo trees, some of the budwood could have been brought to Winter Park. There was a short railroad that ran from Orlando through Winter Park to Oviedo. Also, resi-

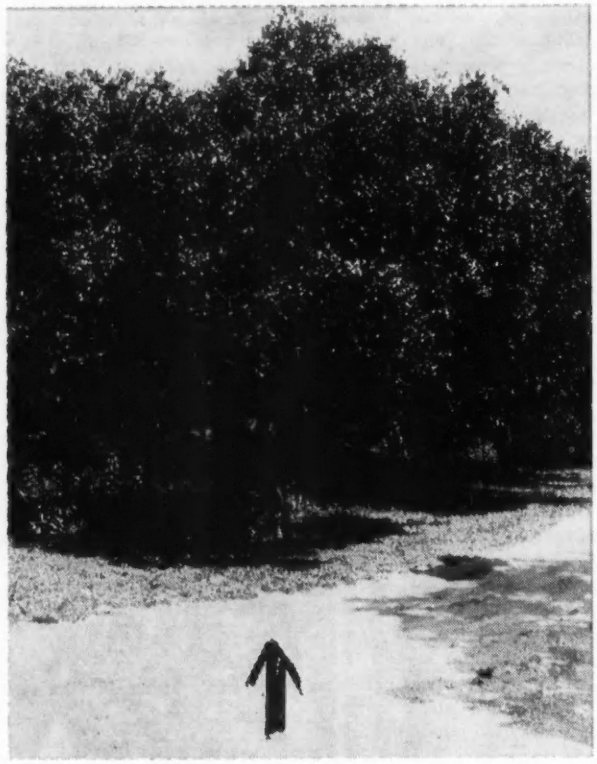


Figure 1. — "Parent" tree of the Temple orange located on the private estate of Jam s Camble Rogers II, Winter Park, Fla.

5/ According to the old records of the Florida Citrus Exchange Mr. William C. Temple was one of the original members of the Board of Directors of that organization. He interrupted his service as a member of the Board to serve as General Manager, 1910-1914.

dents of Oviedo would quite naturally pass through Winter Park on their way to trade at Orlando.

"There was a rumor in Winter Park that part of the grove in which the 'Parent' Temple tree stands was formerly a nursery. That would easily account for the fact that the grove is part seedling, and part budded on sour orange, grapefruit, and shadrock root stock. Trees on such root stock were set out hit and miss throughout the grove. It could have been left-over trees in a nursery that were used to fill in where there were misses in that part of the grove already set out, and to set out additional acreage. If the nursery rumor was true, the operator might have secured some of the 'Jamacia' budwood from the Captain.

"To protect the fruit, foliage and budwood of the 'Parent' Temple tree during the severe freeze of February 1917, the owner placed a tent over the tree, with a small oil heater, a thermometer, lantern, an extra supply of kerosene, and a cot mattress and blankets inside. The owner stayed inside all night to keep the temperature at a safe level. On emerging from the tent at daybreak, the owner found that the fruit and leaves on adjacent orange trees were frozen and later dropped off. When the tent was removed, from the 'Parent' Temple tree, it was found that neither the fruit, foliage, nor budwood had been damaged by the freeze. It was a wonderful sight with its highly colored fruit and dark, shiny leaves, standing among trees that had been defoliated by the freeze.

"So many people interested in the development of the citrus industry in Florida came to see the 'Parent' Temple tree that it soon became evident that some means had to be devised to protect the fruit and budwood. For such protection, the owner erected a twelve-foot woven-wire fence about the tree, with a gate and padlock. The fence stood for several years until thousands of Temple trees were planted throughout the citrus sections of the state. At the time that the Buckeye Nurseries were heavily advertising the Temple orange trees and pushing their sale, it was estimated that an average of two hundred people per day came to see the 'Parent' tree. The protective fence proved its worth.

"A name for the new orange had to be decided upon before trees of the new variety could be placed on sale. The matter was discussed between Mr. M. E. Gillett, head of the Buckeye Nurseries, and the owner of the 'Parent' tree. It developed that each felt grateful to Mr. William C. Temple for his part in bringing them together, and that each had thought favorably of calling the new orange by the name of Temple, and as the word 'Temple' was euphonious, as well as expressive of their gratitude to Mr. Temple, they definitely decided upon the name of 'Temple' for the new orange. In the Florida Grower of February 7, 1920, Edgar A. Wright, editor, writing under the heading of 'The Lancer', states that he suggested the name' Temple, presumably to Buckeye Nurseries. However that may be, no mention of such a suggestion by Mr. Wright was made at the meeting between Mr. Gillett and the owner.

"Thousands of acres of Temple oranges have been planted in Florida and Texas. The history of such plantings and the development of those groves can best be told by someone more familiar with facts

Continued on page 26

The Fruit Situation

By
Zach Savage
Agricultural Economist
Agricultural Experiment Station

General

Supported by an increasing flow of income, consumer demand for fresh and processed fruits is expected to continue strong in 1960. From now until mid-1960, total supplies of fresh and processed fruits are expected to be moderately larger than in the same period of 1958-59.

Markets within the United States continue to be by far the principal outlet for fruit produced in the United States, but export outlets are always a factor. Prospects are for larger exports of most United States fresh and processed fruits in 1959-60 than in 1958-59, in view of decreased deciduous fruit production, some reduction in import restrictions and continuing prosperity in Europe. Increased availability of United States canned and dried fruits for export in 1959-60 should result in larger exports of these items, though at lower prices than in 1958-59. But competition from foreign dried fruit and Mediterranean citrus is expected to be heavy in European markets.

Increased packs of canned, dried and frozen fruits (excluding juices) are expected in 1959-60. Most of the 1959-60 packs of canned fruits so far reported are somewhat larger than packs of the same fruits in 1958-59. The total pack will be moderately above the relatively large one in 1958-59. On October 1, 1959, total stocks of frozen deciduous fruits and berries in cold storage were about the same as a year earlier.

Citrus

Increased production of citrus fruits — oranges, especially — is in prospect for 1959-60. The new crop of early and midseason oranges, now on the way to market, is expected to be about 3 percent larger than the 1958-59 crop and 12 percent above average. For Valencias, prospective production is up in Florida, Texas and Arizona. But the 1959-60 crop of grapefruit may not be greatly different from 1958-59. However, there will be more pink and red grapefruit than last season. Fewer tangerines, but more tangelos are in prosepct for 1959-60. Early season sales of Florida oranges and grapefruit brought somewhat lower prices than in 1958.

Despite accelerated movement of frozen concentrated orange juice during late summer and early fall from the record 1958-59 pack, carryover stocks this fall are somewhat heavier than last fall. Stocks of canned single-strength orange juice are about the same as last fall, but those of some other canned single-strength citrus juices also are larger. Output of frozen and canned citrus juices in 1959-60 is still uncertain.

Source: 1960 Outlook issue of The Demand and Price Situation, AMS, USDA.

Reese Tells Of New Tangerine Hybrid

The U. S. Department of Agriculture, recognizing that commercial nurseries constitute the principal centers for the distribution of citrus plants, has adopted the policy that the initial release of budwood of these new varieties should be through nurserymen who are registered with the Florida State Plant Board.

Applications, in writing, for budwood of these varieties will be accepted by the U. S. Department of Agriculture, U. S. Horticultural Field Station, 2120 Camden Road, Orlando, Florida, until February 1, 1960. The number of buds per nurseryman will depend on the number of applicants and the supply of available buds.

Division of budwood will be made in the spring, and each recipient will be notified as to when he can get the budwood. In the event that the original supply of budwood exceeds the demands, and as additional budwood develops on the original source plants, it will be available to anyone upon request.

The Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, here releases three new varieties of hybrid tangerine: **Robinson, Osceola** and **Lee.** These originated at the U. S. Horticultural Field Station, Orlando, Florida, and were selected by Philip C. Reece and Frank E. Gardner. These varieties, selected under Florida climatic conditions, are probably best suited to Florida and to Texas where climatic conditions are similar. In hardiness they may be classed with the Dancy tangerine. All are siblings of a cross of Clementine (Algerian tangerine) X Orlando tangelo.

ROBINSON (Orlando 426-7-4) is a large, bright orange-red, sweet tangerine hybrid. Fruits are medium sized, about 3 inches in diameter, 2-½ inches high and easy to peel. The crops are medium heavy and show little of the Dancy tendency to alternate bearing. Fruit passes acceptable maturity standards in early October and is at its prime during October and November. The fruit is seedy in mixed plantings.

OSCEOLA (Orlando 426-12-3) is an exceptionally high-colored orange-red tangerine hybrid that usually produces heavy crops of attractive fruit. They are somewhat lower in sugars and higher in acids and slightly smaller than the Robinson. The variety is at its best in November and the flavor is generally good. The fruit is seedy in mixed plantings.

LEE (Orlando 421-36-4) somewhat resembles an orange in size and shape, or its pollen parent, the Orlando tangelo. Although this variety has medium solids (sugars) and rather low acids, the fruit tastes very sweet because of the high ratio of solids to acids. The fruits develop a bright orange rind color by late October or early November. It may be peeled easily and resembles a Temple orange in this characteristic.

Information on sources of budwood may be obtained from Dr. Philip C. Reece, U. S. Horticultural Field Station, 2120 Camden Road, Orlando, Florida.

(signed) M. W. Parker
Director, Crops Research Division

Citrus Container Inst.

Oranges and grapefruit packed in corrugated cartons with vents on all surfaces cool at about the same rate as those packed in four-fifths bushel wirebound crates, according to a report just issued by the Agricultural Marketing Service of the U. S. Department of Agriculture.

This conclusion is based on preliminary results from six tests involving rail shipments from the Indian River district, the report said.

The corrugated container popularly known as the "Indian River carton" was used in the government's tests. This is a telescope type carton, with ventilation openings on all surfaces. Originally, this carton was used exclusively by Indian River

Continued on page 23

CITRUS CONTAINER INST.

Continued from page 22

shippers but is now being used also by some packers outside the Indian River area.

Results of the tests made by the U. S. D. A. are contained in bulletin 342 entitled "Shipping Florida Citrus Fruit in Wirebound Crates and Cartons — A Comparison of Commercial Practices," issued by the marketing research division of the Agricultural Marketing Service. The tests were conducted by J. R. Winston, senior horticulturist; Randall H. Cubbedge, biological science technician, and Jack Kaufman, plant pathologist, of the biological science branch of the Agricultural Marketing Service.

The introduction in the bulletin points out that "wirebound crates have long been in general use as citrus shipping containers in Florida with little change in design or loading pattern."

"By contrast," the bulletin continues, "both container design and load pattern for fiberboard cartons have been modified several times during the past 10 years in attempts to obtain more rapid cooling of the load."

Six test shipments were made in the spring and early summer of 1958, the bulletin states, in paired cars of similar design. For each car loaded with oranges or grapefruit in crates, there was a companion car with the same variety packed in cartons. Test packages of comparable fruit were placed in the middle layer at the quarterlength position of each car for inspection at destination.

Each shipment was precooled at least five hours starting immediately after loading, and both cars of each pair received the same refrigeration service in transit.

Fruit in the two types of containers showed almost identical response in lowered temperature to precooling, ice meltage and other in-transit refrigeration and temperature on arrival at destination, the bulletin reports.

Mechanically refrigerated cars, commonly used for frozen foods, are "adequate for citrus when loaded with warm fruit in either crates or cartons, especially in hot weather," the bulletin states.

"Fruit in the package with the greatest amount of ventilation and loaded in the pattern which permits the best circulation of air between or through the containers would be expected to cool most rapidly," the report continues.

"In these studies, fruit in wirebound crates loaded in the customarily used layer-offset pattern cooled at about the same rate as fruit in cartons loaded by the more open 'spaced bonded-block' pattern customarily used for this type of container."

MUTUAL ISSUES ANNUAL STATISTICAL REPORT

If you're quick on the figure, a splendid way to become an expert on Florida citrus would be to absorb the 110 pages of facts and statistics contained in Florida Citrus Mutual's just-off-the-press 1958-59 Annual Statistical Report.

The book, compiled by Mutual's Statistical and Economics Division of which Bob White is the economist and market analyst and Bill Connor the statistician, gives you the last-word data on everything pertinent to citrus from production and utilization to what the weather in the citrus belt was about this time last year

Since the Florida Canners Association has been in existence over 23,035,012,959 cans of Florida Sunshine and Vitamin C have been preserved and delivered to the consumer.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr., & R. S. Carlin
P. O. Box 1304
Winter Haven, Fla.

We have been busy in this area with the application of Fall fertilizer, and growers are now beginning to prepare the groves for the Winter season. The young trees are being banked and before much longer the wood and firepots will have been placed throughout the colder areas.

Growers should continue to be on the lookout at this time for Red and Purple Scale infestations, also Rust, Purple and Texas Mites.

If dry weather continues, the effects of root damage caused by the excessive water received this Summer will be more evident. Fruit splitting seems to have stopped considerably since the end of the Summer rains.

We would like to take this opportunity to wish all of you a Merry Christmas and a Happy and Prosperous New Year.

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

Eaves Allison
P. O. Box 365, Sarasota, Fla.
Phone Fulton 8-2611

Harvest time is always a welcome time in any crop — if the returns are good. Right now the citrus crop is going to market, with the prices more or less satisfactory and the quality very good for this time of year.

Oranges seem to be a little slow reaching their maturity this fall, and the trees in many instances are slow about reaching their winter dormancy. These troubles are nothing that a little cold weather can't correct.

All groves in this area have grown well this year and at this time most young plantings are still showing flushes of new growth, even though fertilization was cut off with August application. The hope is that this growth will harden up before any really dangerous cold spells come along.

Fall vegetables have done better this time in financial returns. Squash, pole beans and tomatoes have moved over to the asset side for a change.

No rain for a month now, and that old black dust rising from farm and grove roads looks pretty good to most of us.

The trailers and the bulk haulers are rolling now with those good Lyons Citrus Mixtures, and it won't be long before spring vegetable crops will have their future assured by ample applications of those good Orange Belt Vegetable Brands. Growers say you can't beat 'em!

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We have had about two weeks without rain, and everything is looking better although some damage from water. Most groves have dried out enough and are being cultivated. Fruit is still moving, but quite a bit won't pass the test. Growers have been very busy taking care of the different insects. Most all young trees have been hoed, and are being banked. Truck farmers are picking some pepper and egg plant, both are bringing satisfactory prices so far. The nice weather is in their favor, and they are setting out winter crops.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glandale 2-8181
Avon Park, Fla.

We are finally getting dry enough in the low areas to work and fertilize the citrus. Being unable to work down the cover crops has delayed the fertilizer application. But where possible fertilizer is being applied.

Overall the trees are looking very good and only in a few cases do we find very much damage from the excessive water, however, when we have some dry weather we will possibly see some damage that we do not see at this time. Some quick acting Nitrogen, close to tree, might help some of the yellow trees to respond.

The extreme cold weather in the Northwest has prompted growers to get the groves free of cover crops and growth under the trees in case of a sneak cold that could move in on us. We are getting things ready for banking young trees and in many cases by this publication this work will be finished. This is a busy time for growers.

The fruit prices are rather discouraging on early fruit but we are hopeful this will improve. Fruit movement is increasing but do not believe it up to normal in any sections.

HILLSBOROUGH PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

I find there is some fruit being bought at this time but not as regular as would be expected. The only fruit that seems to be sold are the ones that will pass the test now. I find rust mites, Texas mites and purple mites very numerous in many groves. These should be handled with a good full clean up spray now so that the trees may go through the winter with pep and vigor. We don't want our citrus trees to go through the winter unhealthy. We should take precautions against these insects as they can be very harmful to our citrus. Fruit seems to have stopped much splitting and seems to be holding quite well. For good quality and top yields a trial should be given Lyons Fertilizer.

LYONS
FERTILIZERS
PRODUCE
MAXIMUM CROPS
OF
FINEST QUALITY

THE IMPORTANCE AND EARLY HISTORY OF THE TEMPLE ORANGE

Continued from page 21

than the writer."

Today the Temple orange in Florida with over one million, six hundred thousand trees is an important variety to the Florida citrus industry. It is one of the most attractive fruits of the citrus group, its beauty and depth of color are seldom equalled. The fruit has a notably fine eating quality. It contains aromatic constituents that impart to flesh and juice a unique and unusually desirable bouquet, spicy and rich.

The Temple attains prime eating condition in January and February in Florida. Unfortunately, it is frequently harvested weeks in advance of best quality. It is the opinion of some horticulturists that the buds of the original Temple of Florida and the Magnet of Jamaica are the same variety; the Ortanique of Jamaica is believed definitely to be a different variety 6/.

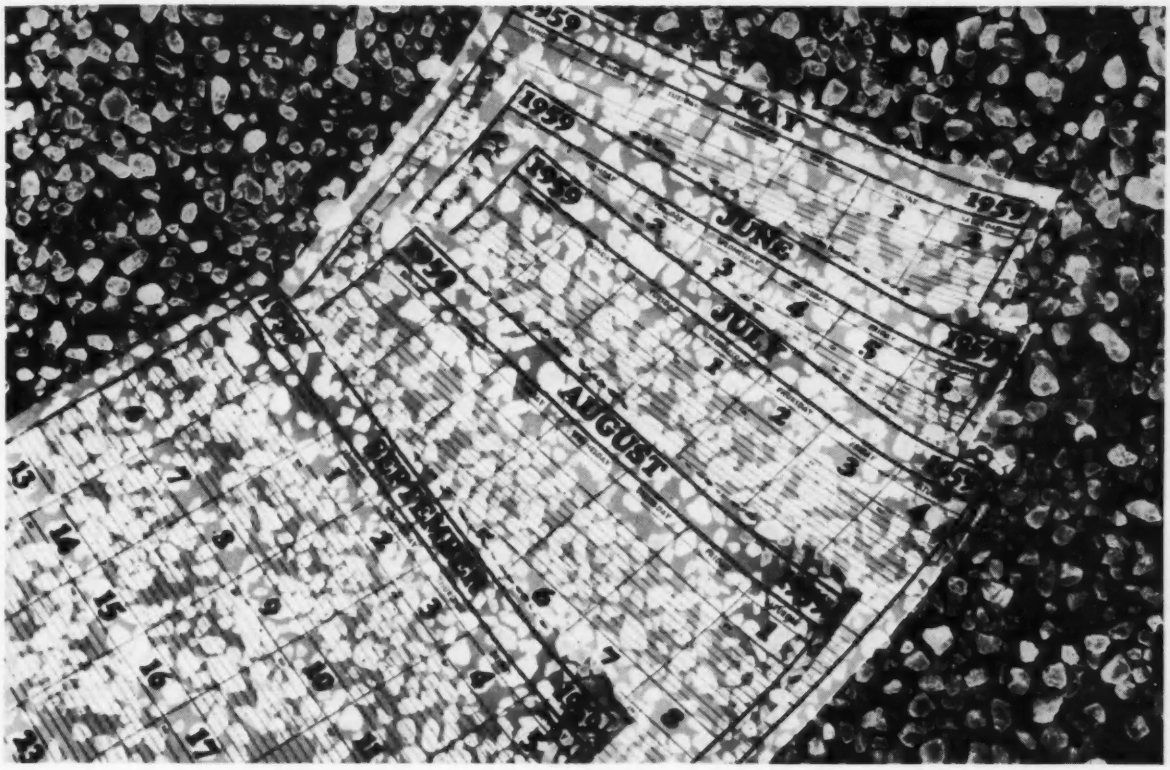
I would like to add my personal acknowledgement to Mr. Louis A. Hakes for his contribution to the citrus industry.

6/ R. E. Crum Ewing, Manager, Agricultural Division, Alumina Jamaica, Limited; J. Henry Burke, Marketing Specialist, U. S. Dept. Agr., Foreign Agricultural Service; and A. F. Camp, formerly Director of the Citrus Station of the University of Florida, Lake Alfred, Florida, personal communications.

RUTLEDGE STATES LOW ACID RESULT OF RAIN

Excessive rainfall during the growing season has resulted in abnormally low acid in many orange crops, says Robert W. Rutledge, Florida Citrus Mutual general manager.

Classified Ads



SUL-PO-MAG in your mixed fertilizer releases magnesium month after month

Granular, Sul-Po-Mag dissolves slowly at a controlled rate. It becomes available a little at a time . . . stays in the soil month after month to feed your trees all season long.

Some other sources require chemical action in the soil before they become usable. Not Sul-Po-Mag! Sul-Po-Mag is water-soluble. It doesn't have to wait for acids from soils and roots to make it available. Sul-Po-Mag sets its own rate of availability and feeds citrus trees to high health and heavy yields.

It doesn't pay to take a chance. Treat your grove soil to the magnesium boost it needs . . . with water-soluble Sul-Po-Mag, the fast-acting, most economical magnesium source of all.

Protect tree health and promote high citrus yields month after month. Start now by making sure that your mixed fertilizer contains Sul-Po-Mag . . . the regularly available magnesium source. Ask for it by name. Sul-Po-Mag — when you buy your mixed fertilizer.

Products for Growth*

50 IMC

1909-1959

*Trademark

S·P·M PREMIUM

Quality fertilizer containing a combination of readily available magnesium and sulphate of potash obtained from Sul·Po·Mag®

Look for this identifying Seal of Approval when you buy. It's your assurance of extra-value fertilizer.

INTERNATIONAL MINERALS & CHEMICAL CORP.
Dept. 21-78, Skokie, Ill.

Please send me a free copy of your "Magnesium" Booklet which discusses magnesium and Sul-Po-Mag for specific crops.

NAME .....

ROUTE .....

TOWN ..... STATE .....

AGRICULTURAL CHEMICALS DIVISION 78-59

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center — Skokie, Illinois

We Invite Comparison...

. . . . It has been the unvarying policy of this company from the first day of its existence to constantly seek to manufacture the finest fertilizers it is possible to produce . . . no expense has been spared to bring about the realization of this objective . . . and as a result only the very finest proven ingredients, and the most modern methods of manufacturing are always characteristic of our fertilizers.

. . . . We make this statement with no desire to belittle the products of other manufacturers, but simply to present the facts to those who grow Florida's fine citrus and vegetable crops.

. . . . Many of the state's most successful growers have been using our fertilizers constantly throughout the years and have demonstrated for themselves the truth of our claims for producing fine fertilizers which result in their fine crops.

. . . . So we invite comparison, and suggest if you are not already a user of Lyons fertilizers, that you set aside a plot, either large or small, in your grove or field and use our fertilizers exclusively in such a test plot . . . and let the results govern your future purchases.

. . . . When you figure the cost of your fertilizers, we recommend that you base any comparison upon the basis of your per box cost of fertilizers, rather than upon your total fertilizer expense.

You will also find our Field Service Men highly competent to advise with you on your production problems . . . and always willing to serve you.

LYONS FERTILIZERS Produce MAXIMUM CROPS Of FINEST QUALITY

Lyons Fertilizer Company

Phone 43-101

TAMPA FLORIDA